

**REMARKS**

Claims 1-9 and 13-45 remain in this application. Claims 10-12 have been cancelled.

**I. CLAIM REJECTIONS – 35 U.S.C. § 102**

**A. Rejection of Claims 1, 2, 31, 36, and 38 Under 35 U.S.C. § 102(e) as Anticipated by Newman**

The examiner rejected claims 1, 2, 31, 36, and 38 under 35 U.S.C. § 102(e) as being anticipated by Newman (U.S. Patent No. 6,321,596 B1).

MPEP § 2131 provides:

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."<sup>1</sup> "The identical invention must be shown in as complete detail as is contained in the ... claim."<sup>2</sup>

**1. Claim 1**

**a) Newman does not anticipate claim 1 because Newman does not transmit video signals to a processor, but instead transmits numerical data indicative of tubing rotation to a processor**

The examiner stated that Newman teaches a conductor transmitting the signals to a processor, stating that each of the sensors are connected to the processor 210, as shown in Figure 3.

Claim 1 requires a conductor transmitting the video signals to a processor. Newman does not disclose a conductor transmitting video signals to a processor, but instead transmits numerical data indicative of tubing rotation to a processor. More on how Newman does not disclose this limitation is discussed below. However, contrary to the examiner's statement that all elements are disclosed by Newman, this element is not. Therefore, the rejection is unsupported by the art and should be withdrawn.

**b) Newman does not anticipate claim 1 because Newman does not generate an image from the camera/video signal provided by the sensor**

The examiner stated that Newman discloses an image grabber generating an image of the tubing. The examiner points to numeral 207 in Figure 3, stating that 207 is a data acquisition

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<sup>1</sup> *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

<sup>2</sup> *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

device and given that one of the sensors is a camera, the data acquisition device necessarily grabs frames, or images from the camera. In the Response to Arguments section of the Final Office Action, the examiner also disagreed with applicants' previous arguments:

Newman discloses a system for measuring characteristics of coiled tubing as it is employed into or extracted out of a well (e.g., column 3, line 19). It is true that Newman discusses different types of sensors that may be used, some of which generate "numerical data" such as the "Hall Effect" sensor at column 5, line 54. However, Newman describes at various places in the specification how other sensors can be used. For example, Newman states that "it is within the scope of this invention to employ one or more of any known suitable sensors as discussed above" (column 5, line 56), and "a sensor 100 (as described above) senses rotation" (column 6, line 43). The sensor "above" that Newman is referring to, and the sensor upon which the examiner was (and is) relying, is the "camera(s)" described at column 3, line 45. Newman states that the "rotational orientation of the line, lines, or dots in monitored visually, with optical scanning device(s), or with camera(s) and the location from which amount of rotation can be calculated ... electronically" (column 3, line 45). Thus, Newman is teaching that the rotation is calculated from optical images of the markings on the tubing. Now, given that the sensor signal, in this case a camera image, is sent directly to device 207 in Figure 3, then device 207 is equivalent to a frame grabber in that it grabs/stores images for subsequent electronic processing. Stated another way, "device 207" grabs signals from sensors and sends them to the main computer 210 as described at column 6, lines 45 and 56." Thus, device 207 meets the criteria of a frame grabber when image signals from the cameras are generated.<sup>3</sup>

Regardless of whether the data acquisition device grabs images, claim 1 requires an image grabber generating an image of the tubing segment from the video signals. Instead, Newman only teaches monitoring rotational orientation of a line, lines, or dots and logging the numerical value of their location using data acquisition device 207:

The rotational orientation of the line, lines, or dots is monitored visually, with optical scanning device(s), or with camera(s) and the location from which amount of rotation can be calculated is logged manually or electronically.<sup>4</sup>

In other embodiments a magnetic line or marking is made along the length of the coiled tubing. In other embodiments, groove(s) or mechanical marks are made along the length of the coiled tubing. In each case the appropriate scanning device(s) are used to monitor the rotational orientation of these markings and the rotation is logged.<sup>5</sup>

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<sup>3</sup> Final Office Action dated 7/23/2003, pp. 3-4.

<sup>4</sup> Newman, column 3, lines 42-46.

<sup>5</sup> Newman, column 3, lines 47-52.

Thus, Newman discloses a data acquisition device 207 that receives signals, including camera signals, and then logs the location of the orientation marker in numerical form, or "engineering units", for processing by the computer 210. This is supported by Newman discussing how the data acquisition device interacts with the sensors in general:

The data acquisition box 207 converts these electronic signals to "engineering units" such as feet, barrels per minute, etc.--digital data which a computer can read.<sup>6</sup>

The examiner incompletely quotes, and thus misquotes, column 3, lines 42-46 for the proposition that the rotational orientation of the line, lines, or dots is monitored visually, with optical scanning device(s), or with camera(s) and the location from which amount of rotation can be calculated... electronically. However, in quoting the specification, the examiner leaves out the portion stating that "the location from which amount of rotation can be calculated is logged manually or electronically." The examiner is leaving out the step of logging "the location" of the orientation of the line, lines, or dots as numerical data, which is performed by the data acquisition device 207. Newman discloses this step twice, in column 3, lines 42-46, and again in column 3, lines 50-52. Once logged, the data acquisition device 207 then sends the logged numerical "location" data to the computer 210 for calculating rotational orientation.<sup>7</sup>

The examiner states that "device 207' grabs signals from sensors and sends them to the main computer 210 as described at column 6, lines 45 and 56" and that thus, device 207 meets the criteria of a frame grabber when image signals from the cameras are generated.<sup>8</sup> The passages referred to by the examiner state:

The device 207 conveys signals indicative of diameter/ovality and of rotation to the computer 210.<sup>9</sup>

Either directly or via the device 207, as shown, the computer 210 selectively sends rotation control signals to a rotation control device 216.<sup>10</sup>

The first quote from Newman is from a discussion of an embodiment where a sensor 100 senses rotation of the coil tubing and sends a signal indicative thereof to the device 207. The device 207 then conveys signals indicative of rotation to the computer 210. However, Newman does not disclose the form of the signals being sent to computer 210 from the device 207. That is, until later when Newman, discussing the same embodiment, states that the data acquisition box 207 converts the signals to "engineering units" such as feet, barrels per minute, etc.--digital data

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<sup>6</sup> Newman, column 7, lines 5-9.

<sup>7</sup> Newman, column 3, lines 42-46.

<sup>8</sup> Final Office Action dated 7/23/2003, pp. 3-4.

<sup>9</sup> Newman, column 6, lines 49-50.

<sup>10</sup> Newman, column 6, lines 56-58.

which a computer can read.<sup>11</sup> Thus, the passage relied on by the examiner actually supports applicants' argument that the information sent to the computer 210 is in engineering unit form.

The second passage refers to signals sent from the computer 210 to the device 207, not from the device 207 to the computer 210. Applicants fail to see how the passage supports the statement by the examiner that device 207 grabs signals from sensors and sends them to the main computer 210.

In summary, Newman teaches a data acquisition device 207 that receives the signals; e.g., camera signals, indicative of the rotation of the tubing from the sensors and converts them into "engineering units" that are readable by the computer 210. Instead of generating an image of the tubing, the data acquisition device 207 generates numerical data representing the location of rotational orientation markers on the coiled tubing. Therefore, the data acquisition device 207 is not an image grabber generating an image of the tubing as required by claim 1. Contrary to the examiner's statement that all elements are disclosed by Newman, this element is not. Therefore, the rejection is unsupported by the art and should be withdrawn.

- c) **Newman does not anticipate claim 1 because Newman does not disclose a processor that analyzes an image to detect discrete anomalies, but instead only discloses a processor that analyzes numerical data**

In the Response to Arguments section of the final Office action, the examiner disagreed with applicants' previous arguments:

Newman captures camera images of markings on the coiled tubing in order to determine a tube's rotation "electronically" (i.e., column 3, line 47). Given that Newman teaches a computer that performs the requisite calculations (i.e., Figure 3, numeral 210), and given that Newman teaches the electronic calculation of a tube's rotation from images of markings on the tubing (i.e., "rotational orientation of the line, lines, or dots is monitored visually, with optical scanning devices(s), or with camera(s) and the location from which amount of rotation can be calculated...electronically" at column 3, line 45), and given that a computer (such as Newman's) is programmed by a computer program, then Newman necessarily anticipates "a program in the processor analyzing the image to detect predetermined features of the tubing segment" as argued by the applicant.<sup>12</sup>

Claim 1, as amended, requires a program in the processor analyzing the image to detect discrete anomalies of the tubing segment.

First, Newman does not teach a program in the processor analyzing the image to detect predetermined features of the tubing segment. As explained above, the computer 210 of Newman

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<sup>11</sup> Newman, column 7, lines 5-9.

<sup>12</sup> Final Office Action dated 7/23/2003, pp. 4-5.

only analyzes digital numerical data in "engineering units"; e.g., degrees of rotation, sent to it from the data acquisition device 207:

The rotational orientation of the line, lines, or dots is monitored visually, with optical scanning device(s), or with camera(s) and the location from which amount of rotation can be calculated is logged manually or electronically.<sup>13</sup>

In other embodiments a magnetic line or marking is made along the length of the coiled tubing. In other embodiments, groove(s) or mechanical marks are made along the length of the coiled tubing. In each case the appropriate scanning device(s) are used to monitor the rotational orientation of these markings and the rotation is logged.<sup>14</sup>

The data acquisition box 207 converts these electronic signals to "engineering units" such as feet, barrels per minute, etc.--digital data which a computer can read.<sup>15</sup>

Therefore, the computer 210 does not analyze an image at all. The computer 210 only analyzes numerical data provided by the data acquisition device 207 to calculate amount of rotation. The examiner again tries to quote column 3, lines 42-46 for the proposition that the rotational orientation of the line, lines, or dots is monitored visually, with optical scanning device(s), or with camera(s) and the location from which amount of rotation can be calculated electronically. However, in quoting the specification, the examiner leaves out that "the location from which amount of rotation can be calculated is logged manually or electronically." As discussed above, the examiner is leaving out the step of the data acquisition device 207 logging "the location" of the orientation of the line, lines, or dots as numerical data. Newman discloses this step twice, in column 3, lines 42-46 and again in column 3, lines 50-52. The computer 210 then receives the logged numerical "location" data to calculate amount of rotation.<sup>16</sup> The computer 210 thus does not analyze the image as claim 1 requires, but instead analyzes logged numerical data provided by data acquisition device 207. Contrary to the examiner's statement that all elements are disclosed by Newman, this element is not. Therefore, the rejection is unsupported by the art and should be withdrawn.

Second, Newman also does not disclose analyzing images of the tubing segment for discrete anomalies. Instead, Newman monitors the rotational orientation of a line, lines, or dots that run the length of the tubing. A line, lines, or dots are not discrete anomalies because they are not distinct or unconnected irregularities. Again, contrary to the examiner's statement that all elements are disclosed by Newman, this element is not. Therefore, the rejection is unsupported by the art and should be withdrawn.

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<sup>13</sup> Newman, column 3, lines 42-46.

<sup>14</sup> Newman, column 3, lines 47-52.

<sup>15</sup> Newman, column 7, lines 5-9.

<sup>16</sup> Newman, column 3, lines 42-46.

## **2. Claim 2**

The examiner stated that, regarding claim 2, the coordinates of the tubing segment are generated.

Because claim 2 depends from claim 1, applicants repeat the arguments made for claim 1. Contrary to the examiner's statements, Newman does not disclose all of the elements of claim 1 and thus claim 2. Therefore, the rejection is unsupported by the art and should be withdrawn.

## **3. Claim 31**

The examiner stated that, regarding claim 31, the limitations therein are met by Newman as described in the claim 1 rejection. With regards to claim 31, the examiner stated that Newman processes images from cameras of the stripes to determine rotation of the tube, among other things, "along the length of the coiled tubing".

Because claim 31 depends from claim 1, applicants repeat the arguments made for claim 1. Contrary to the examiner's statements, Newman does not disclose all of the elements of claim 1 and thus claim 31. Therefore, the rejection is unsupported by the art and should be withdrawn.

## **4. Claims 36 and 38**

The examiner stated that, regarding claim 36, the limitations therein are met by Newman as described in the claim 1 rejection. With regards to claim 36, the examiner stated that Newman processes images from cameras of the stripes to determine rotation of the tube, among other things, "along the length of the coiled tubing". Regarding claim 38, the examiner stated that Newman anticipates camera locations along levelwind.

Because claims 36 and 38 depend from claims 1 and 31, applicants repeat the arguments made for claims 1 and 31. Contrary to the examiner's statements, Newman does not disclose all of the elements of claim 1 and thus claims 36 and 38. Therefore, the rejection is unsupported by the art and should be withdrawn.

## **II. CLAIM REJECTIONS - 35 U.S.C. § 103**

### **A. Rejection of Claims 1, 5-7, 9, 15, 17, 22, 23, 31-33, 37, 39, and 41 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Gorria et al.**

The examiner rejected claims 1, 5-7, 9, 15, 17, 22, 23, 31-33, 37, 39, and 41 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy and Gorria et al. (U.S. Patent No. 5,408,104 A).

In the Response to Arguments section of the final Office action, the examiner disagreed with applicants' previous arguments, stating:

The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 f.2d 413, 208 USPQ 871 (CCPA 1981). The examiner contends that, given the McCoy and Gorria references and the suggestions and teaching therein, it would have been obvious to one of ordinary skill in the art to utilize image sensors and image processing software as taught by Gorria, in order to capture images and inspect the coiled tubing of McCoy for the presence of defects. Regarding the "lighting" differences between the Gorria environment and the "well" environment of McCoy, one of ordinary skill would have no problems making the combination work. As evidence of this, Newman has no problems measuring coiled tubing properties using captured images in the environment of deploying the tubing into and out of a well. **Yes, the illumination of the McCoy and Gorria combination would require modifications.** However, it is well within the capabilities of one of ordinary skill in the art. McCoy and Gorria is NOT A LITERAL COMBINATION OF STRUCTURES. Rather, the teaching of Gorria is combined with McCoy. While the examiner has carefully considered applicants' arguments, the "Reasonable Expectation of Success" argument in this case is no convincing given the high level of skill in the art, and the fact that the prior art (e.g. Newman) teaches an image sensor for measuring coiled tubing properties in the same well environment that applicant is alleging is not possible.

**1. Claims 1, 5-7, 9, 15, 17, 22, 23, 31-33, 37, 39, and 41 are not obvious because McCoy combined with Gorria fail to suggest analyzing individual images**

Although the examiner accurately describes the test for obviousness, MPEP § 2142 states that the examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness. To establish a *prima facie* case of obviousness...the prior art reference (or references when combined) must teach or suggest all the claim limitations.<sup>17</sup>

Gorria teaches comparing measurements taken at two different times and then comparing the two measurements against each other:

Data acquisition and processing means measure, **at equal successive time intervals**, numerical values corresponding for each pixel to the amount of light received at the end of the time.<sup>18</sup>

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<sup>17</sup> MPEP § 2143.

<sup>18</sup> Gorria, column 2, lines 23-26.

**The processing means determines those defects by measuring the differences between the numerical values of each pixel that are successively measured after two exposure times such as  $t_1$ ,  $t_2$ .**<sup>19</sup> It is then possible to determine the sum of those differences for all of the pixels, the variation in the value of that sum making it possible to detect the appearance or disappearance of defects.<sup>20</sup>

Claims 1, 5-7, 9, 15, 17, 22, 23, 31-33, 37, 39, and 41 are not obvious because McCoy combined with Gorria fail to teach or suggest all of the limitations of the claims. Claims 1, 15, and 31 are the rejected independent claims. Each of the claims, as currently amended, requires analyzing the tubing by analyzing an individual image taken at a given time. However, Gorria only discloses analyzing the surface by comparing "images" taken at two different time intervals and does not teach or suggest analyzing individual images. In fact, Gorria does not even disclose analyzing images, but instead discloses comparing the amount of light reflected from the surface to an individual pixel at two different time intervals. Thus, there is no *prima facie* case of obviousness because Gorria and McCoy fail to teach or suggest all of the limitations of the claims. Therefore, the rejection is unsupported by the art and should be removed with respect to claims 1, 15, and 31. The remainder of the claims depend from claims 1, 15, and 31. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>21</sup> Therefore, the rejection should be removed with respect to the dependent claims as well.

**2. The claims are not obvious because there is no suggestion or motivation to combine the teachings of McCoy and Gorria**

Although the examiner accurately describes the test for obviousness, MPEP § 2142 states that the examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

To establish a *prima facie* case of obviousness...[f]irst, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.<sup>22</sup> The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.<sup>23</sup> Also, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.<sup>24</sup> In addition, if the proposed modification or combination of the prior art would change the principle of

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<sup>19</sup> Gorria, column 2, lines 48-51.

<sup>20</sup> Gorria, column 2, lines 51-55.

<sup>21</sup> MPEP § 2143.03.

<sup>22</sup> MPEP § 2143.

<sup>23</sup> MPEP § 2143.01, citing *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

<sup>24</sup> MPEP § 2143.01, citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).



operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.<sup>25</sup>

Gorria teaches a process and apparatus for the automatic monitoring of long products. The process comprises using at least one linear CCD camera and a lighting means that lights the region of the product, towards which the camera is oriented. The inspected surface of the lit region is formed by a linear bar of N pixels that is oriented transversely with respect to the axis of movement of the product.<sup>26</sup> Data acquisition and processing means measure, at equal successive time intervals, numerical values corresponding for each pixel to the amount of light received at the end of the time.<sup>27</sup> The highest values are obtained for an excellent surface state of the product that reflects, like a mirror, the light coming from the lighting means. Stains or blemishes absorb a more or less substantial amount of light, while the various changes in level or scratches deflect or disperse the light. The processing means determines those defects by measuring the differences between the numerical values of each pixel that are successively measured after two exposure times such as t1, t2.<sup>28</sup> It is then possible to determine the sum of those differences for all of the pixels, the variation in the value of that sum making it possible to detect the appearance or disappearance of defects.<sup>29</sup> The lighting means used is advantageously an annular fluorescent tube, a complimentary lighting means of the same strength possibly being disposed in the region of the current supply means if the annular fluorescent tube does not extend around 360 degrees.<sup>30</sup> Preferably the tube is supplied with direct current at a stabilized voltage.<sup>31</sup>

There is no motivation to combine Gorria with McCoy because doing so would render Gorria unsatisfactory for its intended purpose of inspecting surface defects. Gorria inspects the differences in the amount of light received by a given pixel at two different times. Thus, Gorria requires the object being examined to be in a controlled environment. For example, Gorria assumes that the surface of the object being inspected is uniform in amount of light reflected if free of defects. With coiled tubing, however, the surface of the coiled tubing, and thus the amount of light reflected, can vary even though no defects are present. Also, the presence of well fluid residues can affect the amount of light reflected from the coiled tubing. Additionally, Gorria requires the material being inspected to be moved along a consistent axis.<sup>32</sup> Otherwise, the results of light measured per pixel would indeterminate as to the detection and location of any defects as the change in light reflected would be measured by different pixels. Gorria would thus not be able to inspect tubing at a well site because the tubing is not in a controlled environment where the surface of the tubing reflects a consistent amount of light when free of defects and because the tubing is not moved along a consistent enough axis. Given the method Gorria teaches and the

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<sup>25</sup> MPEP § 2143.01, citing *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

<sup>26</sup> Gorria, column 2, lines 15-18.

<sup>27</sup> Gorria, column 2, lines 23-26.

<sup>28</sup> Gorria, column 2, lines 48-51.

<sup>29</sup> Gorria, column 2, lines 51-55.

<sup>30</sup> Gorria, column 4, lines 41-45.

<sup>31</sup> Gorria, column 4, lines 45-46.

<sup>32</sup> Gorria, column 4, lines 60-63.

amount of variances involved with coiled tubing, combining McCoy with Gorria would render Gorria unsatisfactory for its intended purpose of inspecting surface defects. Thus, there is no *prima facie* case of obviousness because there is no motivation to combine Gorria and McCoy. Therefore, the rejection is unsupported by the art and should be removed with respect to all of the claims.

Additionally, combining Gorria with McCoy and modifying Gorria per Newman would necessitate changing the principle of operation of Gorria. The examiner suggested that, regarding the "lighting" differences between the Gorria environment and the "well" environment of McCoy, one of ordinary skill would have no problems making the combination work. As evidence of this, the examiner references that Newman has no problems measuring coiled tubing properties using captured images in the environment of deploying the tubing into and out of a well. However, instead of monitoring the amount of light reflected from the tubing onto pixels at different time intervals, modifying Gorria would require visually monitoring rotation, logging numerical data indicative of rotation, and then analyzing that data with a computer. Modifying Gorria per Newman as the examiner suggests would change the entire principle of operation of Gorria. Thus, there is no *prima facie* case of obviousness because there is no motivation to combine Gorria and McCoy. Therefore, the rejection is unsupported by the art and should be removed with respect to all of the claims.

#### **B. Rejection of Claim 26 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Puffer**

The examiner rejected claim 26 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy et al. (U.S. Patent No. 5,767,671 A) and Puffer (U.S. 4,563,095 A). In the Response to Arguments section, the examiner disagreed with applicants' previous arguments:

First, claim 26 requires "an input device configured to receive video signals and generate sequential images from the video input. The claim does not further define or limit the term "video", other than requiring "video signals" and "sequential images". A "video" signal is simply, and broadly, known in the art as a sequence of raster scanned images. This is exactly what Puffer teaches. That is, Puffer teaches a matrix type image sensor ("array or matrix" at column 5, line 38), wherein an image is raster scanned from the image sensor ("scanning raster for scanning the pixel outputs" at column 5, line 61), and where the process is repeated for a sequence of frames ("each scanning frame" at column 6, line 16). Thus, while Puffer does not use the term "video", the sequence of images scanned by Puffer fully meet the requirement of a video sequence.

Puffer reads images (Figure 2, numeral 45), extracts features from the images ("scanning and pixel outputs" at column 5, line 61; "light signal for a respective pixel" at column 5, line 65; the light intensity of pixels represents features of the tubing being viewed), and compares feature sizes against user defined thresholds. (Puffer discloses at least two thresholds that meet this requirement: First, the "intensity of the light signal for a respective pixel exceeds a

threshold which is preselected" at column 5, line 65 and second, "preselected count...indicative of a flaw" at column 6, line 3).

MPEP § 2142 states that the examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness. To establish a *prima facie* case of obviousness, the prior art references must teach or suggest all the claim limitations.<sup>33</sup>

There is no *prima facie* case of obviousness because neither McCoy nor Puffer teach or suggest an input device configured to receive *video* signals and generate *sequential images* from the *video* input. The examiner asserts that the matrix type image sensor in Puffer meets this requirement. The examiner quotes Puffer saying that an image is raster scanned from the image sensor ("scanning raster for scanning the pixel outputs" at column 5, line 61), the process is repeated for a sequence of frames ("each scanning frame" at column 6, line 16), and that the sequence of images scanned by Puffer fully meet the requirement of a video sequence. As the examiner stated, Puffer discloses raster scanning images from the detector 38 to create a "video" sequence as defined by the examiner. However, claim 26 requires an input device configured to receive video signals and generate sequential images from the video input. Instead, under the examiner's definition, Puffer discloses a detector 38 that generates a sequence of raster scanned images, or a video signal. If the detector 38 in Puffer received a video signal under the examiner's definition, the images would have to be raster scanned before being sent to the detector 38. Thus, there is not *prima facie* case of obviousness because McCoy and Puffer do not teach or suggest all of the claim limitations. Therefore, the rejection is unsupported by the art and should be withdrawn.

Additionally, applicants have amended claim 26 to require at least one output device producing video signals of the tubing surface, an input device configured to receive the video signals and generate sequential images of the tubing surface from the video input, and a pattern classification software program configured to read the images and extract discrete anomalies of the tubing from the images and compare the size of the discrete anomalies against user-defined thresholds. McCoy and Puffer also fail to disclose all of the limitations of the claims because Puffer only discloses analyzing the scanned detector pixel outputs for signal intensity indicative of the amount of light reflected from a "pip". The light reflected onto the detector 38 is not an image of the tubing surface, but is instead an "image" corresponding to the amount of light reflected off the "pip".<sup>34</sup> Thus, Puffer does not disclose anything relating to video or images of the tubing surface itself, only to "images" that "correlate" to pips on the surface. Because the "images" only correlate to pips, they are not images of the pips themselves, much less images of the surface of the tubing. Also, Puffer only discloses analyzing the amount of light reflected from a "pip". Puffer does not disclose reading images of the tubing surface and extracting discrete anomalies of the tubing from the images. Thus, there is no *prima facie* case of obviousness because the McCoy and Puffer fail to disclose or suggest all the limitations of the claims. Therefore, the rejection is unsupported by the art and should be withdrawn.

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<sup>33</sup> MPEP § 2143.

<sup>34</sup> Puffer, column 4, lines 57-60.

**C. Rejection of Claims 27-30 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Puffer and Further in View of Kanzaka et al.**

The examiner rejected claims 27-30 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy et al. and Puffer as applied to claim 26 above, and further in combination with Kanzaka et al. (U.S. Patent No. 5,680,473).

Applicants repeat the arguments made above for claim 26. As stated above, the combination of McCoy and Puffer does not render claim 26 obvious. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>35</sup> As claims 27-30 depend from claim 26, claims 27-30 are also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claims 27-30 as well.

**D. Rejection of Claim 3 Under 35 U.S.C. § 103(a) as Being Unpatentable Over Newman and Kanzaka et al.**

The examiner rejected claim 3 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Newman and Kanzaka. The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to mix the location coordinates and images of Newman as taught by Kanzaka in order to have a log of the actual images along with locations for future review and analysis of tube rotations, and to be able to pinpoint exactly where on the tubing defects are located for longevity analysis and repair/correction of the tubing.

Applicants repeat the arguments made above for claim 1. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>36</sup> As claim 3 depends from claim 1, claim 3 is also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claim 3 as well.

**E. Rejection of Claim 4 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Gorria et al. and Further in View of Endsley et al.**

The examiner rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy and Gorria as applied to claim 1, and further in combination with Endsley (U.S. Patent No. 6,005,613 A). The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the CCD camera taught by Endsley, as the CCD camera required by the McCoy and Gorria combination, in order to keep the system cost low by using a standard, commercially available and off-the-shelf camera, while providing a high quality 640x480 image to ensure an accurate inspection.

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<sup>35</sup> MPEP § 2143.03.

<sup>36</sup> MPEP § 2143.03.

Applicants repeat the arguments made above for claim 1. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>37</sup> As claim 4 depends from claim 1, claim 4 is also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claim 4 as well.

**F. Rejection of Claims 8, 24, and 25 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Gorria et al. and Further in View of Newman**

The examiner rejected claims 8, 24, and 25 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy and Gorria as applied to claim 6, and further in combination with Newman.

**1. Claims 8 and 25**

The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to include a determination of diameter as suggested by Newman, as part of the coiled tube evaluation of the McCoy and Gorria combination, because "change in diameter" is an indicator of "deformations that can cause problems when using the coiled tubing".

Applicants repeat the arguments made above for claims 1 and 15. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>38</sup> As claim 8 depends from claim 1 and claim 25 depends from claim 15, claims 8 and 25 are also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claims 8 and 25 as well.

**2. Claim 24**

The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to mark the tubing of the McCoy and Gorria combination, with the lines taught by Newman, in order to provide an indication for the measurement of "amount of rotation" for "accurately determining coiled tubing fatigue life and/or deformation" to ensure proper functioning of the tube, and avoid the cost associated with a tube's failure during a mining operation.

Applicants repeat the arguments made above for claim 15. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>39</sup> As claim 24 depends from claim 15, claim 24 is also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claim 24 as well.

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<sup>37</sup> MPEP § 2143.03.

<sup>38</sup> MPEP § 2143.03.

<sup>39</sup> MPEP § 2143.03.

**G. Rejection of Claim 16 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Gorria et al. and Further in View of Greenwood et al.**

The examiner rejected claim 16 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy and Gorria as applied to claim 15 and further in combination with Greenwood et al. (U.S. Patent No. 3,770,111 A). The examiner admitted that while the McCoy and Gorria combination requires image capture devices around the periphery of the tubing, McCoy and Gorria do not teach the use of fiber optic image devices. The examiner stated that Greenwood teaches an optical inspection system wherein Greenwood teaches the use of fiber optic imaging devices. The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the fiber optic image devices of Greenwood, in order to capture the images required by the McCoy and Gorria combination, in order to "gather light over a much larger portion" of the tubing with "a considerable decrease in optical complexity", thereby providing an accurate and detailed image using a less complex, less prone to failure, and lower cost image system.

Applicants repeat the arguments made above for claim 15. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>40</sup> As claim 16 depends from claim 15, claim 16 is also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claim 16 as well.

**H. Rejection of Claims 18, 21, 34, 35, and 40 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Gorria et al. and Further in View of Kanzaka et al.**

The examiner rejected claims 18, 21, 34, 35, and 40 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy and Gorria as applied to claims 15 and 31 and further in combination with Kanzaka.

The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to provide and encoder and distance information taught by Kanzaka to the computer of the McCoy and Gorria combination in order to precisely note the location of the defect so that it can be further examined by an operator and/or repaired, and to provide data for the ultimate determination of the tube's life and possible failure modes.

Applicants repeat the arguments made above for claims 15 and 31. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>41</sup> As claims 18 and 21 depend from claim 15 and claims 34, 35, and 40 depend from claim 31, claims 18, 21, 34, 35, and 40 are also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claims 18, 21, 34, 35, and 40 as well.

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<sup>40</sup> MPEP § 2143.03.

<sup>41</sup> MPEP § 2143.03.

**I. Rejection of Claims 18-21 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Gorria et al. and Further in View of Chiu et al.**

The examiner rejected claims 18-21 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy and Gorria as applied to claim 15 and further in combination with Chiu et al. (U.S. Patent No. 6,031,931 A).

The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to provide the encoder and distance information taught by Chiu, to the computer of the McCoy and Gorria combination, in order to detect the "beginning" of inspection when the tube starts to move, to "synchronize camera operation with" the tube's movement, and to precisely note the location of the defect so that it can be further examined by an operator and/or repaired, and to provide data for the ultimate determination of the tube's life and possible failure modes.

Applicants repeat the arguments made above for claim 15. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>42</sup> As claims 18-21 depend from claim 15, claims 18-21 are also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claims 18-21 as well.

**J. Rejection of Claim 42 Under 35 U.S.C. § 103(a) as Being Unpatentable Over McCoy et al. and Gorria et al. and Further in View of Husseiny**

The examiner rejected claim 42 under 35 U.S.C. § 103(a) as being unpatentable over the combination of McCoy and Gorria as applied to claim 31 and further in combination with Husseiny (U.S. Patent No. 5,210, 704 A).

The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to monitor defect growth on the coiled tubing of the McCoy and Gorria combination, and thereby identify defects when a threshold has been reached as taught by Husseiny, in order to identify "incipient failures...during operation" and provide an indication to the operation of the tube's "expected life" along with "a warning for the remaining time until failure of the equipment", thereby providing the operator with the ability to predict a failure before it actually occurs in order to take appropriate action and avoid costly losses during an operation.

Applicants repeat the arguments made above for claim 31. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>43</sup> As claim 42 depends from claim 31, claim 42 is also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claim 42 as well.

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<sup>42</sup> MPEP § 2143.03.

<sup>43</sup> MPEP § 2143.03.

**K. Rejection of Claim 42 Under 35 U.S.C. § 103(a) as Being Unpatentable Over Newman and Hussein**

The examiner rejected claim 42 Under 35 U.S.C. § 103(a) as being unpatentable over the combination of Newman and Hussein.

The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to monitor defect growth on the coiled tubing of Newman, and thereby identify defects when a threshold has been reached as taught by Hussein, in order to identify "incipient failures...during operation" and provide an indication to the operation of the tube's "expected life" along with "a warning for the remaining time until failure of the equipment", thereby providing the operator with the ability to predict a failure before it actually occurs in order to take appropriate action and avoid costly losses during an operation.

Applicants repeat the arguments made above for claim 31. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>44</sup> As claim 42 depends from claim 31, claim 42 is also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claim 42 as well.

**L. Rejection of Claims 13, 14, and 43-45 Under 35 U.S.C. § 103(a) as Being Unpatentable Over Terry et al. and Newman**

The examiner rejected claims 13, 14, and 43-45 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Terry et al. (U.S. Patent No. 6,296,066 B1) and Newman.

**1. Claims 13 and 14**

The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the tubing taught by Terry, as the tubing required by Newman, because it is "very strong" and "resistant to abrasion", thus preventing premature wear and failure due to continuous deployment into and out of wells.

MPEP § 2142 states that the examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness. To establish a *prima facie* case of obviousness, the prior art references must teach or suggest all the claim limitations.<sup>45</sup>

There is no *prima facie* case of obviousness because Terry and Newman fail to teach or suggest all of the limitations of the claims. Claims 13 and 14 require an imaging device recording video signals of a segment of the coiled tubing and a processor receiving the video signals from the imaging device. Applicants repeat the arguments made for claims 1 and 31. As stated above, the computer 210 in Newman is not a processor that receives the video signals from the imaging

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<sup>44</sup> MPEP § 2143.03.

<sup>45</sup> MPEP § 2143.



device. The computer 210 in Newman instead analyzes logged numerical data from the data acquisition device 207. Thus, there is no *prima facie* case of obviousness because Terry and Newman fail to teach or suggest all of the limitations of the claims. Therefore, the rejection is unsupported by the art and should be removed with respect to claims 13 and 14.

## 2. Claims 43-45

The examiner stated that it would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the coiled tubing taught by Terry, as the tubing for well deploying and monitoring required by Newman, in order to make it "easy to determine the wear locations" (Terry, column 10, line 33).

Applicants repeat the arguments made above for claim 1. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious.<sup>46</sup> As claims 43-45 depend from claim 1, claims 43-45 are also not obvious under 35 U.S.C. § 103(a). Therefore, the rejection should be withdrawn with respect to dependent claim 42 as well.


## CONCLUSION

Applicants respectfully request reconsideration the pending claims and that a timely Notice of Allowance be issued in this case. If the examiner feels that a telephone conference would expedite the resolution of this case, he is respectfully requested to contact the undersigned.

In the course of the foregoing discussions, applicants may have at times referred to claim limitations in shorthand fashion, or may have focused on a particular claim element. This discussion should not be interpreted to mean that the other limitations can be ignored or dismissed. The claims must be viewed as a whole, and each limitation of the claims must be considered when determining the patentability of the claims. There may also be other distinctions between the claims and the prior art that have yet to be raised, but that may be raised in the future.

Respectfully submitted,

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<sup>46</sup> MPEP § 2143.03.